Disk Drives

Shown below are computer disk drives containing components made of a new material known as AlBeMet™, which is a compression of "aluminum beryllium metal matrix composite." The material was developed by Brush Wellman, Inc., Cleveland, Ohio for research applications in the National Aero-Space Plane (NASP) program earlier conducted jointly by NASA and the Department of Defense, no longer active.

The NASP program was structured to develop the enabling technologies for future hypersonic and transatmospheric vehicles that offer low cost access to space. Because such vehicles would be capable of operating within the atmosphere for long periods, they would encounter temperature extremes well beyond those the Space Shuttle experiences, hence materials development has been a particular focus of NASP. To enable the vehicles to withstand such temperatures, NASP researchers investigated a number of lightweight, high strength, oxidation-resistant materials for both airframe and engine structures, including metal matrix, organic, refractory and highly conductive composites.

AlBeMet is one such advanced material. It combines the low density and high stiffness of beryllium with the ductility, ease of manufacture and low cost of aluminum. The material reduces system weight and its high thermal conductivity can effectively remove heat and increase an electrical system's lifetime. First applied to spacecraft structures and to the electrical subsystem of an advanced technology military aircraft, AlBeMet has moved into the commercial market. Brush Wellman Applications Development Center is producing an AlBeMet rotary actuator for high performance disk drives manufactured by Maxtor Corporation, San Jose, California.

The AlBeMet 160 used in the disk drive is as stiff as steel and lighter than aluminum, and it has 3.5 times the stiffness/weight ratio as aluminum alone. A lighter, stiffer arm assembly means the heads can be moved faster, improving disk performance. According to Brush Wellman, the material allows the disk drive to have a mean access speed 20 percent faster than would be possible with any other material on the market. Because of the material's stiffness, fingers were able to be reduced by one-third the thickness, allowing twice as many disks in the same space.

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